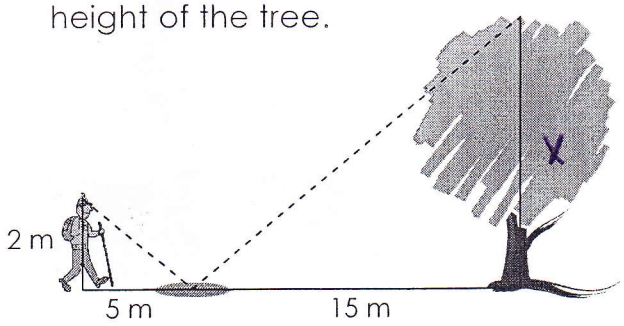
Name: _____ Jan. 2010 EXAM

A1) A hiker can see the reflection of the top of a tree in a puddle. **Determine** the height of the tree.



$\frac{X}{2} = \frac{15}{5}$

$X = \frac{15 \times 2}{5}$

$X = \frac{30}{5}$

$X = 6$

∴ the height of the tree is 6m.

A2) **Convert** 35 centimetres to inches.

35 centimetres = ☐ inches?

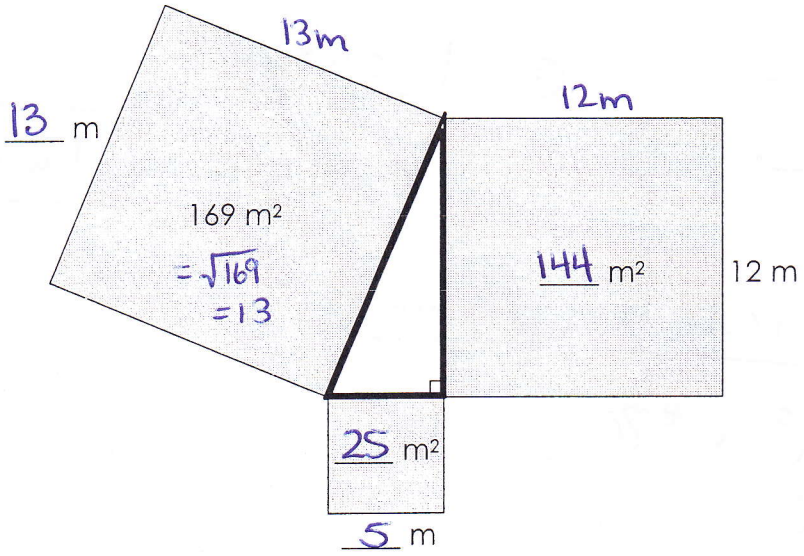
$\frac{X}{1\text{inch}} = \frac{35\text{cm}}{2.54\text{cm}}$

$X = 13.78\text{cm}$

$\frac{X}{35\text{cm}} = \frac{1\text{ inch}}{2.54\text{cm}}$

$X = 13.78\text{cm}$

A3) The following right triangle has squares on each side. **Determine** the 4 missing side lengths and areas.



$c^2 - b^2 = a^2$

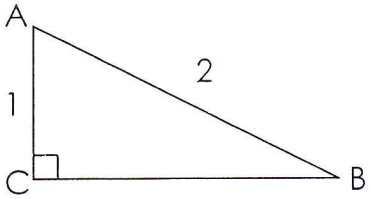
$169 - 144 = a^2$

$25 = a^2$

$\sqrt{25} = \sqrt{a^2}$

$a = 5$

A4) In the triangle below where $\sin B = \frac{1}{2}$, **determine** angle B to the nearest degree.



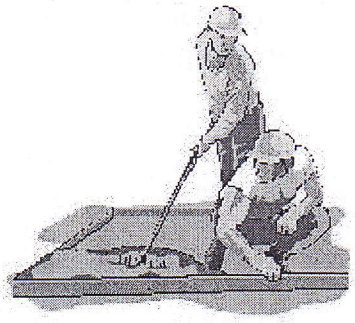
$\sin B = \frac{1}{2}$

$\sin^{-1}(\sin B) = \sin^{-1}(\frac{1}{2})$

$B = 30°$

∴ ∠B is 30°

B) A section of sidewalk measures 6 feet by 6 feet by 0.3 feet. If poured concrete costs $80 per cubic yard, **determine** the cost of making a sidewalk with 10 sections.



Convert to yards

① 6ft = 2 yards

0.3ft = 0.1 yards

$\frac{6\text{ft}}{3\text{feet}} = \frac{x}{1\text{yard}}$

$x = 2$

$\frac{0.3\text{ft}}{3\text{feet}} = \frac{x}{1\text{yard}}$

$x = 0.1$

② $V = l \times w \times h$

$= 2 \times 2 \times 0.1$

$= 0.4 \text{ yards}^3$

} Volume of one section of sidewalk.

③ 10 sections

$0.4 \times 10 = 4 \text{ yard}^3$

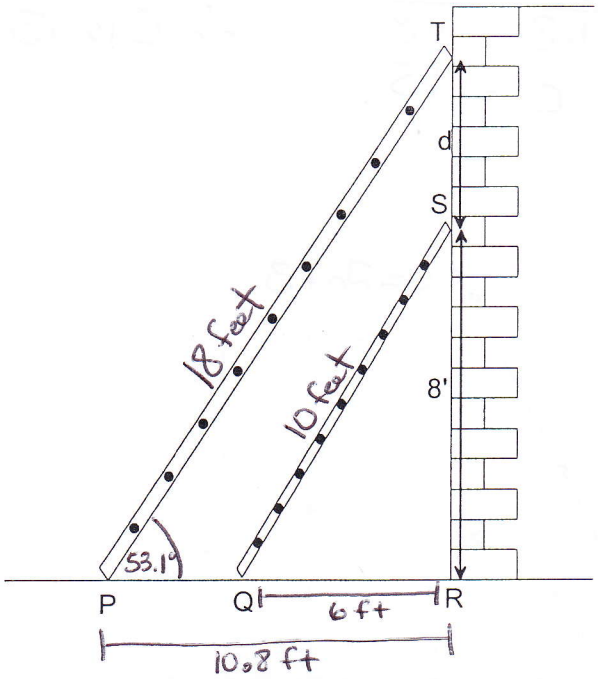
④ Cost $80 per cubic yard for concrete

$= 4 \text{ yard}^3 \times \$80$

$= \$320$

∴ it will cost $320 for 10 sections

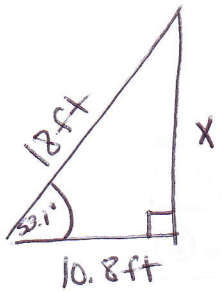
C) Two ladders leaning against a wall make the same angle with the ground. The smaller ladder reaches 8 feet up the wall.



PT = 18 feet
QS = 10 feet
PR = 10.8 feet
QR = 6 feet
angle P = 53.1°

Use some measurements from the table above to **determine** the difference in the heights of the ladders (the value of d in the diagram). **Show your work.**

Large Triangle



$\sin\theta = \frac{O}{H}$

$18 \cdot \sin 53.1° = \frac{X}{18} \cdot 18$

$14.39 = X$

$X \cong 14.39$

Value of d

$14.39 - 8 = d$

$6.39 = d$

$d \cong 6.39$

∴ d is approximately 6.39 ft long.

D1) Given $F = 1.8C + 32$, **solve** for C when $F = 59$.

$59 = 1.8C + 32$

$59 - 32 = 1.8C$

$27 = 1.8C$

$\frac{27}{1.8} = \frac{1.8C}{1.8}$

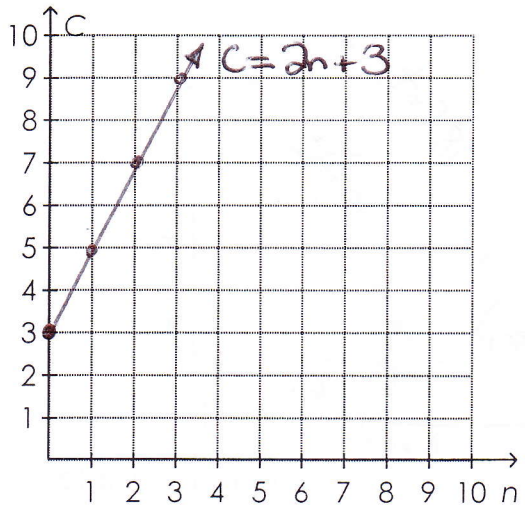
$C = 15.$

∴ C is 15.

D2) **Graph** the relation $C = 2n + 3$.

$b = 3$

$m = \frac{2}{1}$



D3) **Solve** the following system of linear equations.

Elimination

$x + y = 4$ ①

$+ \quad 2x - y = 5$ ②

$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

Sub $x = 3$ into ①

$x + y = 4$

$3 + y = 4$

$y = 4 - 3$

$y = 1$

∴ the POI is $(3, 1)$

Substitution

Rearrange ①

$x + y = 4$

$y = 4 - x$

Sub $y = 4 - x$ into ②

$2x - y = 5$

$2x - (4 - x) = 5$

$2x - 4 + x = 5$

$3x = 5 + 4$

$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

Sub $x = 3$ into ①

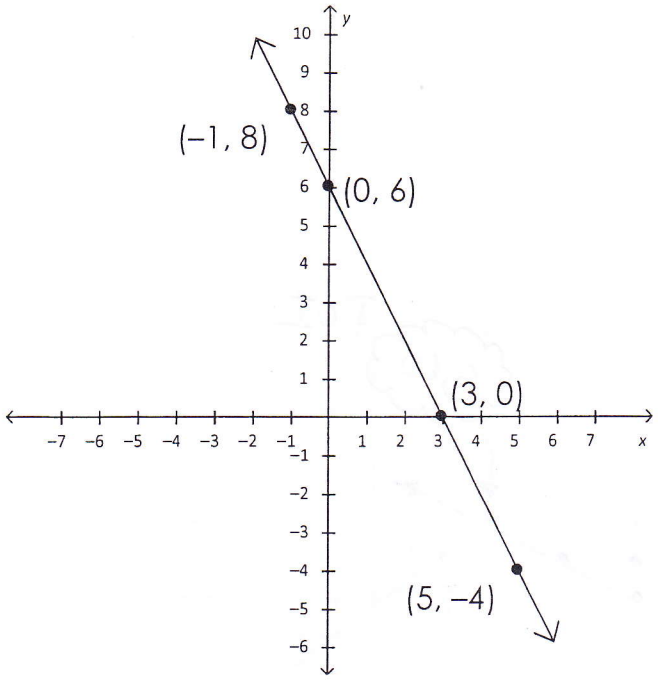
$x + y = 4$

$3 + y = 4$

$y = 4 - 3$

$y = 1$

E) Three possible relations to model the data are shown. **Determine** which of the 3 models is best for the data on the graph. **Explain** your reasoning.



1. $y = -\frac{1}{2}x + 6$

2. $y = 2x - 6$

3. $2x + y = 6$

Rearrange

$y = -2x + 6$

① $y = -\frac{1}{2}x + 6$

- The y intercept is correct
- The slope is not correct. If I go down 1 and over 2 the line will be different. The graph shown has a slope of −2

② $y = 2x - 6$

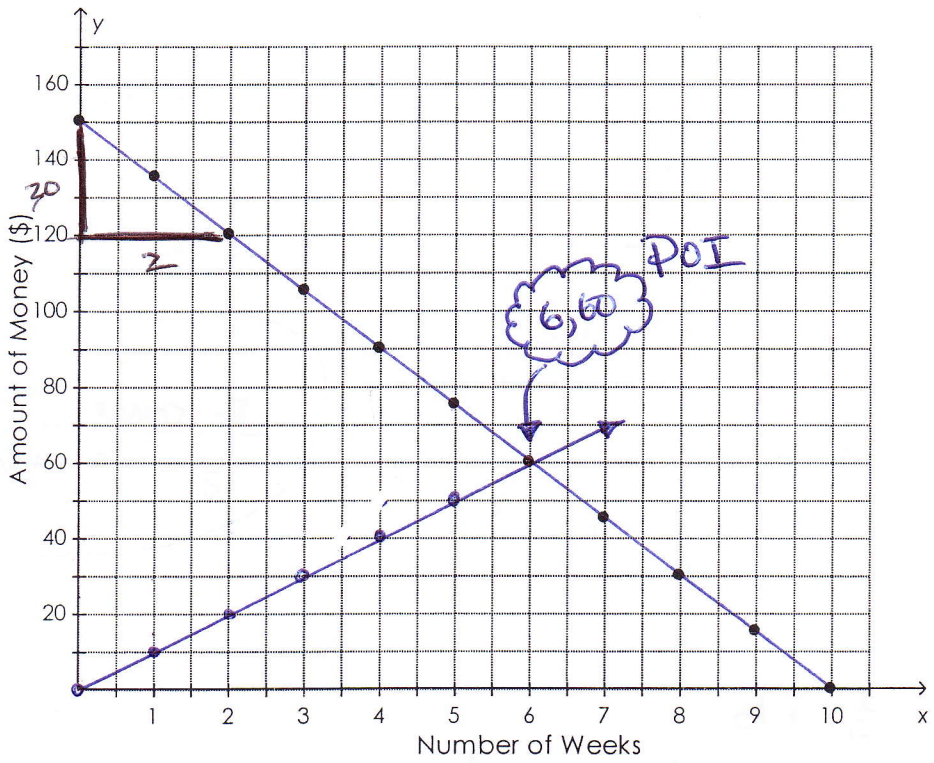
- incorrect y intercept
- incorrect slope (positive slope)
- a positive slope goes up from left to right.

③ $y = -2x + 6$

- correct y intercept
- correct slope (negative)
- the slope goes down from left to right.

F) **Bank Planning with Ricky and Gina**

Ricky has money in the bank. He plans to take out the same amount at the end of each week. The graph shows how much money he has in the bank.



a) **State** the y-intercept and **explain** what it means in this situation.

The y-intercept is 150.

The y-intercept is the initial amount of money in Ricky's bank account.

b) **Determine** the slope. Then **explain** what the slope means in this situation.

$$\text{Slope} = \frac{20}{2}$$
$$= 15$$

The slope represents the amount of money Ricky takes out of his bank account every week.

Gina has no money in the bank but she plans to deposit $10 at the end of each week.

c) This table shows Gina's savings plan. **Plot** these points on the grid on the previous page and extend the pattern for **ten** weeks.

Number of Weeks	0	1	2	3	4
Gina's Savings	0	10	20	30	40

d) **State** the point of intersection and **explain** what it means in this situation.

POI (6, 60)

The POI is the point when both Gina & Ricky have the exact same amount of money ($60) in their bank accounts at the same time (6 weeks).

e) If the point of intersection changes to (5, 75), who would have to change their banking plan? **Describe** the features of a possible new plan.

Gina #1

y-intercept of (0,0) stays the same & she increases her deposits to $15. The slope increases

Gina #2

y-intercept of 25 & she keep the same deposits of $10 per week. New y-intercept but the same slope.

G1) **Expand** and **simplify** $(x+3)(2x-1)$

$= (x+3)(2x-1)$

$= 2x^2 - x + 6x - 3$

$= 2x^2 + 5x - 3$

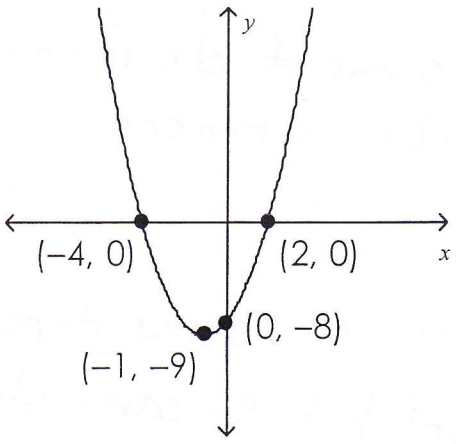
G2) **Factor** $x^2 + 8x + 12$

$= x^2 + 8x + 12$

$= (x+2)(x+6)$

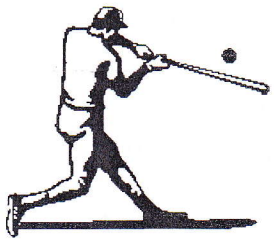
	x	$+2$
x	x^2	$2x$
$+6$	$6x$	12

G3) **Identify** the features of the following graph.

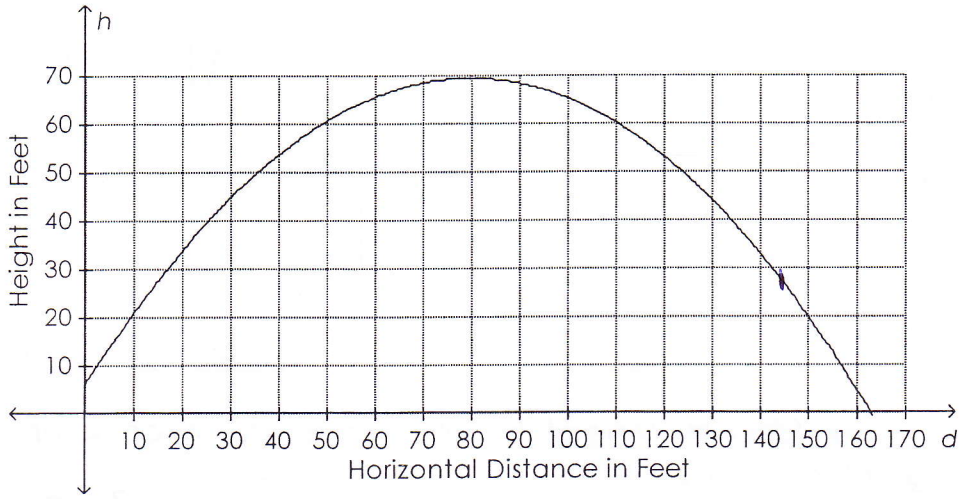


x-intercepts	-4 & 2
y-intercept	-8
coordinates of the vertex	$(-1, -9)$
direction of opening	up

H) The following graph represents the path of a baseball hit by a batter. It shows the baseball's height above the ground, ***h*** in feet, and horizontal distance travelled, ***d*** in feet.



The path of the ball is represented by $h = -0.01d^2 + 1.6d + 5$.



a. **State** where the baseball hits the ground. 163 ft

b. **State** the maximum height of the baseball. 70 ft

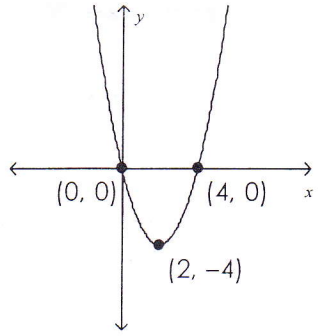
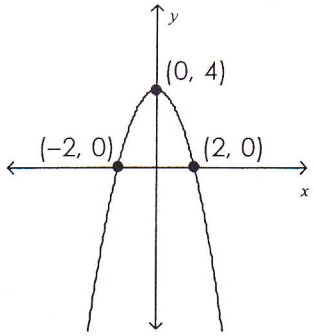
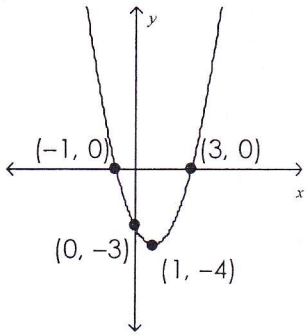
c. **Explain** why the initial (beginning) height of the baseball is not zero.

The ball is hit at a height of 7ft. If the story was about golf then the ball could have been hit from the ground. Since it is baseball the ball is thrown at waist height & hit at waist height. The graph is actually incorrect since most people are not 14ft tall.

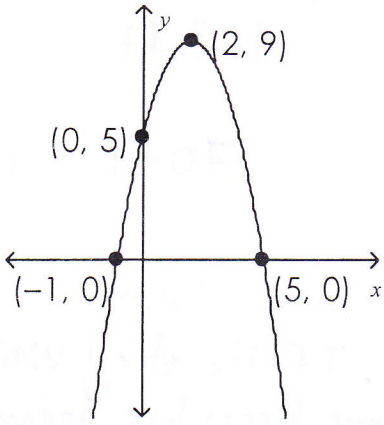
d. Could the baseball pass over a fence that is 145 feet from the batter? **Justify** your answer.

The balls height is 25ft at a horizontal distance of 145ft. Since most fences are approximately 10ft tall the ball will pass over the fence.

I) Sabeh correctly factored the following equations and graphed them. Her notes were...

$y = x^2 - 4x$ $y = x(x-4)$	$y = -x^2 + 4$ $y = -(x-2)(x+2)$	$y = x^2 - 2x - 3$ $y = (x-3)(x+1)$
		

Based on her notes, **explain** why <u>none</u> of the following equations could be the equation of the graph shown below.



1. $y = (x+1)(x-5)$
2. $y = -x^2 - 4x + 5$
3. $y = -x^2 + 5$

③ $y = -x^2 + 5$
- opens down good
- y-intercept good
- vertex (0, 5) <u>not correct</u>

---

① $y = (x+1)(x-5)$
- y intercept is <u>not</u> correct (−5) <u>also</u> opens up
- both zeros are correct
- axis of symmetry $= \frac{5+(-1)}{2} = \frac{4}{2} = 2$ is correct
- sub $x = 2$ into equation

$y = (2+1)(2-5)$
$= (3)(-3)$
$= -9$

} Vertex (2, −9) is not correct.

---

② $y = -x - 4x + 5$
$= -1(x + 4x - 5)$
$= -(x-1)(x+5)$

- zeros are <u>incorrect</u>
- y-intercept is good
- opens down good
- axis of symmetry $x = \frac{-5+1}{2} = -2$ Vertex (−2, 9) <u>not correct</u>

<u>sub $x = -2$ into equation</u>

$y = -(x-1)(x+5)$
$= -(-2-1)(-2+5)$
$= -(-3)(+3)$
$y = +9$